# Key Equations

*Equation* 12.1 (page 477)

Boyle's law (where  P is the pressure and  V is the volume)

 P 1 V 1 equals P 2 V 2

*Equation* 12.2 (page 478)

Charles’s law (where  T is the Kelvin temperature)

 V 1 Over T 1 equals V 2 Over T 2 

*Equation* 12.3 (page 479)

General gas law (combined gas law) for a fixed amount of gas

 P 1 V 1 Over T 1 equals P 2 V 2 Over T 2 

*Equation* 12.4 (page 481)

Ideal gas law (where n is the amount of gas (moles) and  R is the universal gas constant, 0.082057 L dot atm divided by K dot mol 

PV equals nRT

*Equation* 12.5 (page 483)

Density of gases (where d is the gas density)

d equals m Over V equals PM Over RT 

*Equation* (page 488)

Dalton’s law of partial pressures. The total pressure of a gas mixture is the sum of the partial pressures of the component gases  P Subscript n  .

 P Subscript tota l equals P 1 plus P 2 plus P 3 plus dot dot dot

*Equation* 12.7 (page 488)

The total pressure of a gas mixture is equal to the total number of moles of gases multiplied by  RT divided by V  .

 P Subscript total equals n Subscript total RT Over V 

*Equation* 12.8 (page 489)

The partial pressure of a gas (A) in a mixture is the product of its mole fraction  X Subscript A  and the total pressure of the mixture.

 P Subscript A equals X Subscript A P Subscript total 

*Equation* 12.9 (page 492)

Maxwell’s equation, which relates the rms speed  the square root of u squared overbar  to the molar mass of a gas (*M*) and its temperature (*T*)

the square root of u squared overbar equals the square root of 3 RT Over M 

*Equation* 12.10 (page 492)

Graham’s law. The rate of effusion of a gas—the quantity of material moving from one place to another in a given amount of time—is inversely proportional to the square root of its molar mass.

 Rate of effusion of gas 1 Over Rate of effusion of gas 2 equals the square root of molar mass of gas 2 Over molar mass of gas 1 